

AMENDMENTS TO THE CLAIMS

1. (Currently Amended) A cold start fuel control system for use with an internal combustion engine having a plurality of combustion chambers, a source of fuel, and a primary intake manifold having an air inlet and an outlet port connected to each combustion chamber, said system comprising:

a cold start fuel injector assembly having an inlet and an outlet,

said cold start fuel injector assembly being fluidly connected to the source of fuel,

an auxiliary intake manifold having an internal chamber,

said cold start fuel injector assembly outlet being fluidly connected to said auxiliary intake manifold chamber,

~~said auxiliary intake manifold chamber being fluidly connected through~~ a control orifice member associated with ~~to~~ each of the combustion chambers, each control orifice member being positioned at a position downstream from the inlet of the primary intake manifold, and adjacent its associated combustion chamber,

a plurality of fuel feed tubes, one fuel feed tube extending between said auxiliary intake manifold chamber and each control orifice member.

2. (Currently Amended) The invention as defined in claim 1 and comprising means to vary the cross-sectional area of said control orifice member.

3. (Cancelled)

4. (Currently Amended) The invention as defined in ~~claim 3~~ claim 28 where said at least one input signal is selected from the group of sensor output signal exhaust gas oxygen sensor output signal, an engine temperature sensor output signal, engine intake manifold vacuum sensor output signal, throttle position sensor output signal, mass airflow sensor output signal, engine rpm and fuel charge lambda sensor output signal.

5. (Currently Amended) The invention as defined in ~~claim 3~~ claim 28 wherein said varying means comprises mechanical varying means.

6. (Currently Amended) The invention as defined in ~~claim 3~~ claim 28 wherein said varying means comprises electromechanical varying means.

7. (Currently Amended) The invention as defined in claim 1 and comprising a shroud positioned in the primary intake manifold in alignment with at least one control orifice member, said shroud having a side open to its associated combustion chamber.

8. (Cancelled)

9. (Currently Amended) The invention as defined in ~~claim 7~~ claim 29 and an actuator which varies the position of said shroud.

10. (Currently Amended) The invention as defined in claim 9 and comprising a shroud control circuit responsive to at least one input signal, said shroud control circuit having an

output signal and means responsive to said output signal for varying the position of each shroud relative to its associated control orifice member.

11. (Original) The invention as defined in claim 9 where said at least one input signal is selected from the group of exhaust gas oxygen sensor, engine temperature, engine intake manifold vacuum, throttle position, mass airflow sensor, engine rpm and fuel charge lambda sensor.

12. (Original) The invention as defined in claim 10 wherein said shroud comprises a wall section mounted in the primary intake manifold, and wherein said varying means comprises means for varying the angle of the plane of the wall section relative to the primary intake manifold.

13. (Currently Amended) The invention as defined in claim 1 wherein the cross-sectional area of each control orifice member provides a substantially equal fuel charge to each combustion chamber.

14. (Cancelled)

15. (Cancelled)

16. (Currently Amended) The invention as defined in ~~claim 14~~ claim 30 and comprising at least two control ~~orifices~~ orifice members associated with each combustion chamber.

17. (Currently Amended) The invention as defined in ~~claim 16~~ claim 30 wherein said control ~~orifices~~ orifice members are arranged to induce a swirl in the fuel flow through said control orifices.

18. (Original) The invention as defined in claim 1 wherein the volume of said auxiliary intake manifold chamber is less than a volume of the primary intake manifold.

19. (Original) The invention as defined in claim 1 wherein said auxiliary intake manifold chamber is fluidly connected to each internal combustion chamber closely adjacent to the outlet of the primary intake manifold at each said internal combustion chamber.

20. (Currently Amended) The invention as defined in claim 1 wherein the internal combustion engine includes a fuel injector associated with each combustion chamber and open to the primary intake manifold, and wherein each said control orifice member is open to the primary intake manifold on a side of the primary intake manifold opposite from the associated fuel injector.

21. (Currently Amended) The invention as defined in claim 1 wherein at least one control orifice member has at least one vane which induces a swirl to fluid flow through the control orifice.

22. (Currently Amended) For use in combination with an internal combustion engine having an engine block, a plurality of combustion chambers, intake air passages formed in the engine block so that one intake air passage is fluidly associated with and connected to each combustion chamber, a source of fuel, and a primary intake manifold having an air inlet and a plurality of outlet ports with at least one port associated with each combustion chamber, said system comprising:

a cold start fuel injector assembly having an inlet and an outlet,

said cold start fuel injector assembly inlet being fluidly connected to the source of fuel,

an auxiliary intake manifold having an internal chamber, said auxiliary intake manifold having a manifold housing portion interposed between the primary intake manifold and the engine block, said manifold housing portion defining a fuel passageway fluidly connecting each air intake passage with its associated port(s) in the primary air intake manifold,

a plurality of control ~~orifices~~ orifice members, at least one control orifice member being associated with each combustion chamber, each control orifice member being open to each one fuel passageway in the manifold housing portion,

said cold start fuel injector assembly outlet being fluidly connected to said auxiliary intake manifold chamber,

a plurality of fuel feed tubes, one fuel feed tube extending between said auxiliary intake manifold chamber ~~being fluidly connected~~ and to each control orifice member.

23. (Currently Amended) The invention as defined in claim 22 and comprising at least two control ~~orifices~~ orifice members open to each fuel passageway in said manifold housing portion.

24. (Currently Amended) The invention as defined in claim 22 and comprising means to vary the cross-sectional area of said ~~orifices~~ orifice members.

25. (Cancelled)

26. (Currently Amended) The invention as defined in ~~claim 24~~ claim 31 and comprising a control circuit responsive to at least one input signal, said control circuit having an output signal and means responsive to said output signal for varying the cross-sectional area of said control orifice member.

27. (Original) The invention as defined in claim 26 where said at least one input signal is selected from the group of exhaust gas oxygen sensor, engine temperature, engine intake manifold vacuum, throttle position, mass airflow sensor, engine rpm and fuel charge lambda sensor.

28. (New) A cold start fuel control system for use with an internal combustion engine having a plurality of combustion chambers, a source of fuel, and a primary intake manifold

having an air inlet and an outlet port connected to each combustion chamber, said system comprising:

- a cold start fuel injector assembly having an inlet and an outlet,
- said cold start fuel injector assembly being fluidly connected to the source of fuel,
- an auxiliary intake manifold having an internal chamber,
- said cold start fuel injector assembly outlet being fluidly connected to said auxiliary intake manifold chamber,

- said auxiliary intake manifold chamber being fluidly connected through a control orifice to each of the combustion chambers at a position downstream from the inlet of the primary intake manifold means to vary the cross-sectional area of said control orifice; and

- a control circuit response to at least one input signal, said control circuit having an output signal and means responsive to said output signal for varying the cross-sectional area of said control orifice.

29. (New) A cold start fuel control system for use with an internal combustion engine having a plurality of combustion chambers, a source of fuel, and a primary intake manifold having an air inlet and an outlet port connected to each combustion chamber, said system comprising:

- a cold start fuel injector assembly having an inlet and an outlet,
- said cold start fuel injector assembly being fluidly connected to the source of fuel,
- an auxiliary intake manifold having an internal chamber,
- said cold start fuel injector assembly outlet being fluidly connected to said auxiliary intake manifold chamber,

said auxiliary intake manifold chamber being fluidly connected through a control orifice to each of the combustion chambers at a position downstream from the inlet of the primary intake manifold; and

a shroud positioned in the primary intake manifold in alignment with at least one control orifice, said shroud having a side open to its associated combustion chamber.

30. (New) A cold start fuel control system for use with an internal combustion engine having a plurality of combustion chambers, a source of fuel, and a primary intake manifold having an air inlet and an outlet port connected to each combustion chamber, said system comprising:

a cold start fuel injector assembly having an inlet and an outlet,

said cold start fuel injector assembly being fluidly connected to the source of fuel,

an auxiliary intake manifold having an internal chamber,

said cold start fuel injector assembly outlet being fluidly connected to said auxiliary intake manifold chamber,

said auxiliary intake manifold chamber being fluidly connected through a control orifice to each of the combustion chambers at a position downstream from the inlet of the primary intake manifold;

wherein each control orifice comprises a body having a through opening, said body being mounted within a seat in said auxiliary intake manifold; and

wherein each body throughbore has an outwardly flared axial end.

31. (New) For use in combination with an internal combustion engine having an engine block, a plurality of combustion chambers, intake air passages formed in the engine block so that one intake air passage is fluidly associated with and connected to each combustion chamber, a source of fuel, and a primary intake manifold having an air inlet and a plurality of outlet ports with at least one port associated with each combustion chamber, said system comprising:

a cold start fuel injector assembly having an inlet and an outlet,

said cold start fuel injector assembly inlet being fluidly connected to the source of fuel,

an auxiliary intake manifold having an internal chamber, said auxiliary intake manifold having a manifold housing portion interposed between the primary intake manifold and the engine block, said manifold housing portion defining a fuel passageway fluidly connecting each air intake passage with its associated port(s) in the primary air intake manifold,

a plurality of control orifices, at least one control orifice being open to each fuel passageway in the manifold housing portion,

said cold start fuel injector assembly outlet being fluidly connected to said auxiliary intake manifold chamber,

said auxiliary intake manifold chamber being fluidly connected to each control orifice;

comprising means to vary the cross-sectional area of said control orifices; and

wherein said varying means comprises electromechanical varying means.